



RESEARCH ACTIVITY HYLIGHT

INTEGRATION OF AIRBORNE HYPERSPECTRAL IMAGERY AND LASER SCANNING DATA TO IMPROVE PROCESSING AND INTERPRETATION

Airborne hyperspectral imaging (HSI) sensors provide the opportunity to generate imagery with more detailed information on the spectral properties (reflectance or spectral signature) of the Earth's surface far beyond the capabilities of broad-band multispectral sensors. Airborne Laser Scanning (ALS) sensors, providing height/structure information, are commonly used to produce digital surface models (DSMs) and digital terrain models (DTMs).

The objective of the EUFAR Joint Research Activity HYLIGHT is to combine the two different airborne remote sensing technologies (HSI and ALS) to improve the processing and analysis of both types of acquired data.

HYLIGHT TOOLS UNDER DEVELOPMENT:

>> Combined analyses of ALS and HSI

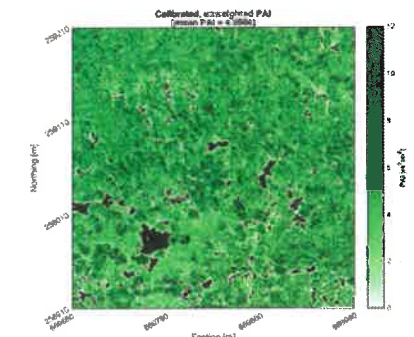
- PML **ALS/HSI target matching tool** : matches near neighbours of ALS to HSI points and vice-versa
- TU Vienna **opalsRadioCal** : uses Full Waveform information to compute reflectance for laser scanning points of extended targets, enhanced by atmospheric correction
- TAU **LWIR radiance Planck fit and Temperature extraction** : Planck curve fitting with temperature extraction and ALS shadow modelling



Example of output of the PAI tool for the Laegern test site (credits UZH)

>> HSI to improve ALS

- PML, ONERA **ALS classification tool** : improves classification of ALS using the HSI classifications. If data are collected at the same time then also classifies cloud & haze
- Czech Globe **BiomassMapper tool** : estimates tree biomass



Extraction of PAI allows the parameterisation of the DART model for the analysis of the 3D radiative budget to quantify the amount of irradiance for each HSI pixel to be used to compensate shadowed pixels

>> ALS to improve HSI

- INTA **SLP_ASP_calculator** : improves the calculation of slope and aspect maps using ALS data and actual characteristics of HSI imagery
- VITO **DSM creator** : creates a DSM from ALS data
- ONERA **ICARE-HS tool** : atmospheric correction of urban HSI images using ALS-derived 3D information
- UZH **AtmoCorr3D** : shadow correction for HSI images using 3D canopy structure parameters derived from ALS and a radiative transfer model
- DLR **LAVA - LAS Variability tool** : calculates error margins of the DSM/ DTM and DSM/ DTM related errors for atmospheric correction steps
- UZH **Irradiance fraction tool** : estimates direct and diffuse irradiance fraction for each HSI pixel using a radiative transfer modelling approach
- VITO **Shadow fraction tool** : shadow fraction with LAS processing and put in the same grid cell
- UZH **PAI estimation tool** : estimates voxel based plant area index (PAI) for the parameterisation of the radiative transfer model DART
- VITO **Tree species classification tool** : classifies tree species using ALS-derived vegetation percentage height values (PHV) as additional layer



HYLIGHT working group photo

For more information, contact lls.Reusen@vito.be or visit www.eufar.net/tools

